2007-05917/

Natural Sciences and Engineering Research Council of Canada

Contact

Investing in people, discovery and innovation

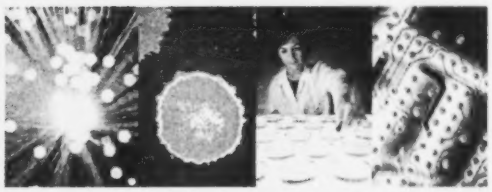
March 2006, Vol. 31, No. 1
ISSN 1714-7425

2 **New Minister Has Ambitious Agenda**

3 **Porphyrin Expert Wins NSERC Herzberg Medal**

4 **2006 Steacie Fellows Named**

www.nserc.gc.ca



NSERC
CRSNG

Making Contacts

Editorial by NSERC President Suzanne Fortier

Suzanne Fortier

Since arriving at NSERC in mid-January, my days have been full of stimulating and enlightening meetings with champions of research, not only our own NSERC researchers and employees, but also leaders in the academic, government, and private sectors. Many windows have been opened, many perspectives offered on our mission at NSERC – all converging around a clear vision: the vision of a country that draws its vitality from its people and builds its future prosperity by investing in the human mind and the human spirit, the vision of a country of discoverers and innovators.

I spent my first week at home, in our Ottawa headquarters, meeting with and talking to members of the NSERC team. What a fantastic team we have! I have found in my co-workers a strong and deep culture of service to our communities, a profound commitment to the success of our researchers, and a desire for our programs to have an impact and make a difference to our country's economic and social well-being. I have discovered that I need not go far to find enthusiastic supporters and strong champions of research and innovation. They are right here at 350 Albert Street and in our new regional offices in Moncton and Winnipeg.

The month of February brought researchers from across the country and around the world to Ottawa to participate in the adjudication of our Discovery Grants and Scholarships applications. I had the pleasure of meeting with the members of almost all the committees and hearing about their ideas, aspirations and challenges. This was a superb opportunity to witness the impact our country's investments in research have had. Thanks to a dynamic and supportive environment, Canada has become a place of choice to study and do research. We have been able to attract great talent to our postsecondary institutions and build strong nuclei in areas of importance to our country. Our community's energy is palpable and so is the incredible opportunity we have to build on a foundation of excellence and strength. Our researchers can compete with the best in the world, and they do just that!

Meeting with the selection committees was also an occasion for me to thank the many people who give so generously of their expertise, wisdom, and time to participate in a process that is viewed around the world as first in its class. Many hours, including

(continued on page 2)

The Natural Sciences and Engineering Research Council (NSERC) is a key federal agency investing in people, discovery, and innovation. It supports both basic university research through research grants, and project research through partnerships among postsecondary institutions, government and the private sector, as well as the advanced training of highly qualified people.

Contact is published by NSERC Communications and can also be found on the Internet at www.nserc.gc.ca/publicat.htm

Editor-in-Chief
Joyce French
E-mail:
joyce.french@nserc.ca

Please send address changes by e-mail to distribution@nserc.ca.

PUBLICATIONS MAIL AGREEMENT NO. 40062835

RETURN UNDELIVERABLE CANADIAN ADDRESSES TO

NSERC
350 ALBERT ST
OTTAWA ON K1A 1H5

Continued from cover page

evenings and weekends, are devoted to making tough choices. The selection committees unanimously praised the high productivity of our researchers, and conveyed their confidence that additional investments would be put to very good use. One can't help but feel that science and research in Canada are in good hands.

Ottawa is a great crossroads that brings together our country's leaders from the academic, government, and private sectors. It has been inspiring to hear their visions for the future, to realize the importance they place on our efforts to build our natural sciences and engineering human capital, and to appreciate their commitment to making Canada a land of opportunity for all. The goal that unites us all is prosperity, a social and economic prosperity built on a solid cultural foundation, which values the spirit of discovery – the human urge to advance knowledge, find answers, and understand our world.

I feel deeply privileged to represent the NSERC community. It is with sincere enthusiasm and great pride that I will speak of your aspirations and celebrate your accomplishments. Thank you for all your help and support.

New Minister of Industry Has Ambitious Agenda

Courtesy Ottawa

The Honourable Maxime Bernier

Canada's new Minister of Industry and the Minister responsible for NSERC, Maxime Bernier, is looking forward to putting his business expertise to use in his new role. The Minister of Industry is resolute in his intention to apply within Industry Canada the principles of transparency and accountability that characterize the new government. His top priority will be to ensure that the government's policies and measures support the competitiveness of Canadian businesses in all sectors. Among his other priorities are enhancing support programs for university research and the commercialization of discoveries, improving the competitiveness of the Canadian economy nationally and internationally, and developing efficient regulations that reduce the burden of red tape for businesses.

Mr. Bernier is a lawyer with a bachelor's degree in commerce, and has significant experience in the financial sector. He has worked for financial and banking institutions and has provided advice on their behalf on various legislative issues.

He was until recently Executive Vice-President of the Montreal Economic Institute, and has also served as Vice-President of Corporate Affairs and Communications for the Standard Life of Canada insurance company and Director of Business and International Relations at the Commission des valeurs mobilières du Québec.

Mr. Bernier was born and raised in the Beauce region of Quebec. This is his first term in the House of Commons.

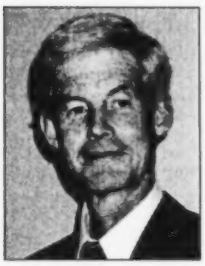
Appointment to NSERC Council

The newest member of NSERC's Council is **Dr. Edwin Bourget**, who was appointed to a three-year term in November.

Dr. Bourget has been the Vice-Rector (Research) at the Université de Sherbrooke since 2001. A biologist specializing in marine ecology, he has written more than a hundred scientific publications and trained numerous graduate students. He also served as the Assistant Dean of the Faculty of Science and Engineering at Université Laval, where he obtained his bachelor's and master's degrees. He received his Ph.D. from the University of Wales, Great Britain.

Edwin Bourget

Porphyrin Expert Wins NSERC Herzberg Medal



Stephen Cook

David Dolphin

Richard Bond

Dr. David Dolphin, University Killam Research Professor in the Department of Chemistry at the University of British Columbia and one of the world's foremost experts in organic chemistry, specifically porphyrins, has been awarded Canada's top science prize – the 2005 Gerhard Herzberg Canada Gold Medal for Science and Engineering. He was presented with the award by Minister Bernier at a ceremony held in Ottawa on March 20.

The award comes with a guarantee of $1 million in research funding over the next five years from NSERC.

The other finalists for the award, Dr. Richard Bond and Dr. Stephen Cook, both of the University of Toronto, each received a $50,000 research grant. Dr. Cook also received the NSERC Award of Excellence, which Dr. Bond received in 2003 and Dr. Dolphin received in 2004.

Dr. Dolphin is one of the founders of modern porphyrin chemistry. During the past 40 years he has published almost 400 scientific papers and has authored or edited 18 books.

Porphyrins – organic molecules such as chlorophyll that interact with light – are used in CDs and DVDs, as well as in the healing chemicals used for light-based medicine, or photodynamic therapy. In 1963, Dr. Dolphin broke into the pages of *Nature* with his first scientific publication – a description of the biological mechanism of Vitamin B-12. In the mid-1960s, while at Harvard, he proved what happens when a chlorophyll molecule absorbs a photon of light, revealing the first step in the photochemical engine that fuels all life on earth.

In the early 1980s, Dr. Dolphin teamed up with then UBC microbiologist Dr. Julia Levy to create Visudyne™, one of the world's most successful ophthalmic products. It uses a light-activated porphyrin molecule to treat age-related macular degeneration, a leading cause of blindness. The company they founded, QLT Inc., is now a global biopharmaceutical company specializing in treatments for eye diseases as well as dermatological and urological conditions.

Dr. Bond is best known for his pioneering work on cosmic background radiation, the photon afterglow of the "Big Bang," using it to determine what the universe is made of (mostly dark matter and dark energy), its geometry, and the origin and evolution of cosmic structure. For over two decades, his inspirational leadership and mentoring of young researchers, as Director of the Canadian Institute for Theoretical Astrophysics at the University of Toronto and as Director of the Canadian Institute for Advanced Research Cosmology and Gravity Program, have helped catapult Canada to worldwide pre-eminence in cosmology.

Dr. Cook is the author of "The Complexity of Theorem-Proving Procedures," more commonly known as Cook's Theorem, which offers a way of dividing computational problems into those that are efficiently solvable and those that are NP-complete, which means they apparently cannot be efficiently solved by computation. This work has applications in many fields, including Internet security. He has received a host of awards, not least of which is the A.M. Turing Award, computer science's most prestigious prize.

Idea to Innovation Program Now Open to College Faculty

NSERC President Dr. Suzanne Fortier announced in February at an Association of Canadian Community Colleges symposium that faculty from eligible colleges may now apply as principal applicants to the Idea to Innovation (I2I) program.

NSERC recognizes the important and growing role colleges are playing in advancing innovation and NSERC's goal is to assist them in increasing this capacity.

The objective of the I2I program is to accelerate the development of technology and promote its transfer to Canadian companies. Colleges are closely linked with local industry and well positioned to work with them in developing and adopting new technology through proof-of-concept projects and feasibility studies, the focus of the I2I program.

For more information and a copy of a CD that provides an overview of the program, the application procedures, the requirements for each phase of the program, and the evaluation process, contact NSERC staff at (613) 947-9485 or I2I@nserc.ca.

2006 Steacie Fellows Named

Minister Bernier presented the 2006 Steacie Fellowships to six of Canada's best up-and-coming scientists during a ceremony in Ottawa on March 20. The fellowships are among Canada's most prestigious science and engineering awards, and are intended to enhance the career development of highly promising university faculty whose research is making a mark on the international scene.

More information can be found at www.nserc.gc.ca/about/prizes_e.asp.

Joerg Bohlmann

Dr. Joerg Bohlmann
University of British Columbia

Dr. Bohlmann is looking for ways to enhance the ability of coniferous trees to fend off the effects of infestations of insects by studying the biochemical language of conifer-insect interactions. For example, when beetles lay eggs that will produce larvae that can harm a conifer's bark, the tree may start secreting volatile compounds that repel beetles or attract their enemies. Beetles, in turn, seem to monitor tree signals and choose those that are less able to present an effective biochemical defence.

Over the course of the NSERC Steacie Fellowship, Dr. Bohlmann and his research group will look for a better understanding of the complex defence systems used by trees, and will try to develop methods to control harmful infestations of insects.

Dr. Andrzej Czarnecki
University of Alberta

Andrzej Czarnecki

Understanding the behaviour of subatomic particles requires highly advanced computational techniques. Dr. Czarnecki provides numerical explanations for observed subatomic phenomena, using complex equations known as perturbation expansions. To help the process, Dr. Czarnecki set up the Centre for Symbolic Computation, which consists of a set of computer clusters using software that makes calculations based on symbols rather than numbers.

The NSERC Steacie Fellowship will help Dr. Czarnecki zero in more closely on a subatomic mystery called the Lamb Shift Effect. First observed in the 1940s, it refers to a discrepancy between the energy levels of electrons in hydrogen atoms that would be expected from quantum mechanics and the levels observed in experiments. The research could provide new insights into the theory of atomic transitions.

John Klironomos

Dr. John Klironomos
University of Guelph

Studies of invasive plants normally examine what happens above ground in the plant's new habitat. Dr. Klironomos believes that getting a complete picture involves studying the underground organisms that may be providing the invaders with nutrients and protection from pathogens as they colonize the soil around the plant's root systems. He argues that it is also important to compare the plant's native habitat with its adopted habitat.

With the help of his NSERC Steacie Fellowship, Dr. Klironomos intends to establish an international network on invasion biology with colleagues in North America and Europe. By comparing notes on the same experiments in different locations, he hopes to uncover clues about an invasive plant's ability to compete in a new environment.

Dr. Todd Lowary
University of Alberta

Todd Lowary

Dr. Lowary's research is aimed at fighting the bacterium that causes tuberculosis by studying the organism's cell wall. Over the course of his NSERC Steacie Fellowship, Dr. Lowary will delve into the role of polysaccharides, complex sugars that form the main structural components of the cell wall and which are attached to fatty molecules called mycolic acids.

In the tuberculosis bacterium, the sugar rings in these polysaccharides exist in the least stable form. This paradoxically appears to provide greater stability to the entire cell wall, by facilitating interactions between the mycolic acids. The fundamental structural studies ongoing in the Lowary group should lead to novel approaches for the development of new anti-tuberculosis drugs. Dr. Lowary's research will be carried out in collaboration with members of the Alberta Ingenuity Centre for Carbohydrate Science and the National Institute of Nanotechnology.

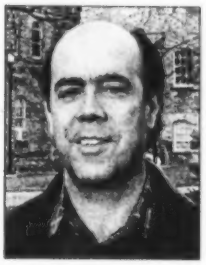
Dr. Gail Murphy
University of British Columbia

Gail Murphy

As software programs are modified through successive generations, it becomes more challenging for developers to make sense of earlier changes when it becomes their turn to update a program. Dr. Murphy is among the pioneers in refining existing tools and creating new ones that will help developers track when specific modifications were made and spot patterns to facilitate the next generation of modifications.

The NSERC Steacie Fellowship will help Dr. Murphy and her team learn more about underlying patterns and the way we work with information. They will be helped by more than 100 developers who have agreed to provide details of their software update activities for inclusion in a database.

Dr. Locke Rowe
University of Toronto


Locke Rowe

Dr. Locke Rowe, who holds the Canada Research Chair in Evolutionary Ecology, is a leading researcher into the evolution of gender differences. Biologists have long been fascinated by traits involved in mating interactions, such as the peacock's attractive tail. Dr. Rowe's contribution has been in recognizing that the evolution of gender-specific traits often results from a conflict between the sexes over reproductive interactions.

Dr. Rowe's interest was initially spurred by observing interactions in water striders, where gender-specific morphology and behaviours appear to result from what can be described as "a co-evolutionary arms race between the sexes." Dr. Rowe has now demonstrated that such co-evolution has occurred in many species. During his NSERC Steacie Fellowship, he will delve into the molecular and genetic basis of this co-evolutionary process.

News From the Regions

B.C. Office to Open Soon

Space for NSERC's B.C. Office has been secured in a downtown Vancouver building located on Melville Street. The facility is currently being prepared and should be ready for occupancy in late March or early April.

Reps Actively Promoting NSERC in Atlantic Canada

"From barbeques to student research fairs, NSERC's Atlantic University Reps have had a successful year promoting NSERC at different venues," says Yves Gagnon, Visiting Executive of the NSERC Atlantic Office.

For example, NSERC Rep Brian Wilson donated prizes for Acadia University's "Gong Show." This popular annual event allows faculty three slides and three minutes to showcase their research. Those who go overtime get gonged!

Throughout 2005, NSERC's Atlantic University Reps also supported, sponsored, and donated prizes to many events including information sessions, Atlantic Provinces Council on the Sciences undergraduate student research conferences, and regional science fairs.

At a meeting organized by NSERC in January, the Reps reviewed and discussed the different activities organized during the past year. The Atlantic Office is enthusiastic about the Reps' progress, and looks forward to continuing its collaboration with the Reps to promote science and engineering in the Atlantic region.

Prairie Office Establishes NSERC Presence

Since September, NSERC's staff in the Prairie Office have focused on establishing a presence through visits and meetings with academic institutions, industry associations and science-based agencies and organizations across the Prairies.

Ray Hoemsen has taken the lead role with the smaller institutions, including the colleges, and has also been working with the Federal Partners in Technology Transfer West (a network of federal public servants dedicated to developing and sharing knowledge, including expertise in technology transfer).

Alfonz Koncan and Irene Mikawoz teamed up with staff from the Strategic Project Grants program to make presentations at western universities on the program's new target areas. Given the innovation thrust of the program, the business community was also invited to attend these briefings.

Alfonz Koncan identified contacts and arranged meetings for Bill Coderre to explore ways to increase the participation of Aboriginals in the natural sciences and engineering. In January, a series of interviews took place with key stakeholders in Manitoba and Saskatchewan.

Irene Mikawoz attended the first advisory board meeting for the NSERC/Cameco Prairie Chair for Women in Science and Engineering (CWSE). She will be working with Julita Vassileva to actively promote CWSE activities in Manitoba and the region.

Staffing for the NSERC Prairie Office will be completed by April 2006, in time for the planned official opening of the office.

Young Researchers Win 2005 Awards

The winners of the 2005 $20,000 Howard Alper Postdoctoral Prize, awarded to an outstanding postdoctoral student, and the 2005 $10,000 André Hamer Postgraduate Prizes, awarded to the top candidates in NSERC's master's and doctoral scholarship competitions, were announced in November.

NSERC Howard Alper Postdoctoral Prize

Dr. Kyle Shen
Condensed Matter Physics
University of British Columbia

Dr. Shen is working to understand why some materials function as superconductors at higher temperatures than others. Working with UBC's Dr. George Sawatsky, Dr. Shen will conduct experiments at the Canadian Light Source synchrotron in Saskatoon to continue exploring nanoscale electron ordering in materials, in hopes of bringing superconductors closer to widespread commercial viability.

Kyle Shen

Jem Berkes

Kenneth Chau

NSERC André Hamer Postgraduate Prizes

Jem Berkes
Electrical and Computer Engineering
University of Waterloo

Mr. Berkes has been building software development skills since elementary school. His career includes creating a software company in his teens and being part of Google's "Summer of Code" project. Under the supervision of Dr. Catherine Gebotys, he is now focused on cybersecurity. Specifically, the master's student will look for ways to prevent information leaks from laptops, cell phones, and handheld devices.

Kenneth Chau
Photonics
University of Alberta

Mr. Chau's curiosity about light led him to discover that terahertz (THz) light waves can be transmitted through metals. Since THz radiation has lower energy levels than X-rays, this could have major implications for biomedical imaging. Working in Dr. Abdulhakem Elezzabi's ultra-fast photonics lab, he is carrying out his doctoral work on practical applications of THz light, including finding a better way to convert sunlight into electricity.

Research Network Grants Go "Strategic"

A name change, a new strategic focus and revised partnership criteria – these are the most important changes NSERC has made to the Research Network Grants program following last year's operational review. The moratorium on new funding has been lifted, and NSERC is now accepting preliminary applications for the 2007 competition.

The Research Network Grants program is now called the Strategic Network Grants program. The name change highlights the fact that, starting this year, the program will fund research networks in the same high-level target areas as the Strategic Project Grants (SPG) program.

The target areas are:

- **Advanced Communications and Management of Information**
- **Biomedical Technologies**
- **Competitive Manufacturing and Value-Added Products and Processes**
- **Healthy Environment and Ecosystems**
- **Quality Foods and Novel Bioproducts**
- **Safety and Security**
- **Sustainable Energy Systems (Production, Distribution and Utilization)**

By focusing both programs on the same strategic research priorities, NSERC will help to increase the critical mass of researchers working in these areas.

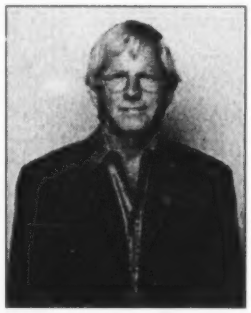
It is important to note a key distinction of the Strategic Network Grants program. Applicants will not be limited to a defined set of research topics as presented within the SPG program. As a result, researchers can focus on any aspect of the target areas.

The partnering requirements as set in the SPG program do apply, however. The focus is on the active participation of industry and government partners in all aspects of the network, from developing the proposal to training students and exploiting the research results.

NSERC has posted the new Strategic Network Grants program description and application instructions at www.nserc.gc.ca/strategic_networks. The deadline for NSERC to receive new preliminary applications for the 2007 competition will be June 30, 2006.

NSERC Industrial Research Chair Launches Gold Standard in Electronic Information Security

Security for electronic information, including digital signature schemes, is a driving concern today. Mathematics researcher Dr. Scott Vanstone hitched his research wagon to this idea back in 1985 when he first heard about elliptic curve cryptography (ECC) from an IBM researcher presenting at the largest cryptography conference in the world.



Scott Vanstone

Not many people in the room that day realized the significance of this fledgling technology, but Dr. Vanstone, a mathematician who had just launched his own IT security solutions company a month earlier, was clearly ahead of the curve.

Today, Dr. Vanstone holds the NSERC/Pitney Bowes Industrial Research Chair in Cryptography. The Chair is supported by industry giant Pitney Bowes as well as St. Jerome's University, the University of Waterloo, the Communications Security Establishment, and Communications and Information Technology Ontario.

Dr. Vanstone is also the mind behind several patented digital signature schemes based on ECC that are being adopted for standardization by diverse groups such as the U.S. National Security Agency (NSA) and international postal agencies, including Canada Post. "In fact," Dr. Vanstone states, "this technology is the only key exchange mechanism endorsed by the U.S. government for protecting classified and sensitive but unclassified information." The commercial value of the work became clear in November 2003 when the NSA paid US$25 million for Dr. Vanstone's algorithm, recommending it as the algorithm of choice for key exchange.

Under the leadership of Dr. Vanstone, the Industrial Research Chair continues to attract several world-class researchers to the University of Waterloo and has attracted considerable additional funding from both industrial and government sources.

It has also led to the establishment of the Centre for Applied Cryptographic Research (CACR) which has forged extensive links to industry and government and is among the largest cryptography research groups in the world. The Centre has hired faculty members in the departments of Combinatorics and Optimization, Computer Science, and Electrical Engineering, trained 22 postdoctoral fellows, and introduced two very successful undergraduate courses in cryptography.

Dr. Vanstone is also the co-founder and executive VP of Certicom Corporation, an IT security company specializing in ECC.

Not only has Dr. Vanstone increased awareness of high-level cryptography, but his collaboration with Pitney Bowes has been a marriage made in heaven. Many scientists and practitioners of cryptography believe that Dr. Vanstone and his collaborators have developed the most efficient digital signature scheme for space-constrained and fault-tolerant applications in postal payment. The cryptographic algorithms and protocols developed by Pitney Bowes and Dr. Vanstone have been adopted by multiple-mailing industries and postal and international standards organizations.

This year, Canada Post will replace all legacy systems with Dr. Vanstone's Digital Post Marks, which several international postal agencies are also considering for standardization. The Industrial Research Chair has also generated several Digital Post Mark patents in collaboration with Pitney Bowes, now being used in several Pitney Bowes security-based products.

Today, Dr. Vanstone enjoys international recognition for developing, standardizing and commercializing a particular security algorithm based on ECC. Success doesn't get much sweeter.

SPG Application Deadline Coming Up

The deadline for submission of applications to the annual Strategic Project Grants competition is April 18, 2006. Contact your Research Services Office for any internal deadlines. Before submitting your application, be sure to review the "Checklist for a Complete Application" on the Web (www.nserc.gc.ca/forms/instructions/101/e.asp?prog=spg). In particular, ensure that your application:

- **explains why the proposed research is strategic and how it addresses the research topic; and**
- **includes Form 183A (plus the letter of support) from the supporting organization(s).**

If you need assistance, contact the Helpdesk at (613) 995-4273 or webapp@nserc.ca.

eBusiness Update

affairs ebusiness

Improving the stability of our on-line eSubmission process was our primary objective for the last year. Critical changes to program coding and to the .pdf attachment process resulted in a 97 per cent reduction in server down incidents and a huge increase in eSubmissions. More than 83 per cent of Discovery Grant and Research Tools and Instruments applications arrived electronically (up from 68, 60, and 20 per cent the previous three years respectively), and we received 70 per cent fewer calls related to .pdf attachments. This progress begs the questions: *Who isn't using the eSubmission system? Why?* We will explore this by talking to Research Grant Officers this year.

The NSERC extranets were another solid success story. We have just finished developing nine new sites and upgrading many of the original sites to provide better navigation and functionality. A total of 19 secure extranet sites are now available to various NSERC committees. These sites have already improved communications and reduced workload. For example, the 3,500 Form 180s received through eSubmission were posted for review by our Grant Selection Committee members. More than 2,900 of them were then updated electronically with members' reviewer selections, thereby replacing multiple mailings and faxes.

Southern Alberta Intellectual Property Network Launches Its Program

The Southern Alberta Intellectual Property Network (SAIP Network) kicked off its program at the Southern Alberta Institute of Technology in Calgary on January 16, 2006. This newly created technology commercialization cluster is a collaborative effort between University Technologies International Inc./University of Calgary, SAIT Polytechnic, Mount Royal College and Red Deer College.

The goal is to share and further develop the resources and expertise of the partner institutions in the area of commercialization. The network has received a $582,234 grant over three years from the tri-agency Intellectual Property Mobilization program. The day's program featured presentations by all the network partner institutions which highlighted the network's motto: "REAL Interaction, REAL Projects, REAL Results." For more information about the SAIP Network, contact Joann Priestley, Manager, SAIP Network at (403) 270-2446 or jpriestley@uti.ca.

Back row from left to right: Paul Cataford, University Technologies International; Alex Zahavich, Innovation and Technology Development Office; Ray Hoemsen, NSERC; Gerry Paradis, Red Deer College; Rick Tofani, Red Deer College; Branko Peterman, Mount Royal College. Front row from left to right: Helen Shannon, University Technologies International; Joann Priestley, SAIP Network.

Nomination Deadlines Coming Up

Don't miss the deadline for submitting your nomination for the following awards:

NSERC Herzberg Medal	**May 1**
Brockhouse Canada Prize	**May 1**
Innovation Challenge Award	**May 15**
Synergy Awards for Innovation	**May 31**
E.W.R. Steacie Memorial Fellowships	**July 4**
Michael Smith Awards	**Sept. 1**
NSERC Doctoral Prizes	**Oct. 1**

For information on the awards and on the nomination procedures, visit **www.nserc.gc.ca/about/prizes_e.asp**.